

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

### **Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application.

### **Listing of Claims:**

Claim 1 (Currently amended): A system for monitoring one or more physiological parameters for diagnosis of congestive heart failure within a patient, said system comprising:

at least one sensing device implanted in a cavity of the patient's cardiovascular system, ~~one or more implantable sensing devices,~~ said sensing device comprising an anchoring mechanism, ~~comprising of~~ at least one inductor coil and at least one sensor, with optional electronic components, said at least one sensing device being implanted so that a portion of said anchoring mechanism passes through a septum of the heart and, to minimize the risk of thrombogenicity, a larger portion of said implantable sensing device is located in the right side of the heart and a smaller portion of said implantable sensing device is located in the left side of the heart and includes the at least one sensor;

a non-implantable readout device that is not implanted in the patient,

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

said readout device ~~comprising of~~ at least one inductor coil having telemetric means for at least one of allowing electromagnetic telecommunication and electromagnetic wireless powering of said sensing device through said at least one inductor coil of said sensing device.

Claim 2 (Currently amended): A system for monitoring one or more physiological parameters for treatment of congestive heart failure within a patient, said system comprising:

at least one sensing device implanted in a cavity of the patient's cardiovascular system, ~~one or more implantable sensing devices,~~ said sensing device comprising ~~comprising of~~ at least one inductor coil and at least one sensor, with optional electronic components;

a non-implantable readout device that is not implanted in the patient, said readout device comprising ~~comprising of~~ at least one inductor coil allowing electromagnetic telecommunication and electromagnetic wireless powering of said sensing device through said at least one inductor coil of said sensing device;

wherein said system is part of a closed-loop pacing/ICD (implantable cardioverter defibrillator) tuning mechanism, data from said at least one sensing device is sent to a patient pacemaker for tailoring of pacing/ICD

Application No. 10/677,694  
 Docket No. IB-8 (A4-1770)  
 Amendment dated February 2, 2006  
 Reply to Office Action of November 2, 2005

function, and said at least one sensing device communicates in accordance with the group consisting of:

said at least one sensing device is directly interrogated by the pacing/ICD unit;

said at least one sensing device is interrogated by the pacing/ICD unit, the system further comprising an external unit solely for transmitting power to said at least one sensing device; and

said at least one sensing device transmits data to an external reader, after which said reader retransmits data to the pacing/ICD unit.

Claim 3 (Currently amended): The system of claim 1 wherein said at least one sensor of the implantable sensing device comprises ~~comprises of~~ at least one capacitive sensor.

Claim 4 (Currently amended): The system of claim 2 wherein said at least one sensor of the implantable sensing device comprises ~~comprises of~~ at least one capacitive sensor.

Claim 5 (Original): The system of claim 1 wherein the implantable sensing device includes a battery.

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

Claim 6 (Original): The system of claim 5 wherein the battery is rechargeable using wireless means.

Claim 7 (Original): The system of claim 2 wherein the implantable sensing device includes a battery.

Claim 8 (Original): The system of claim 7 wherein the battery is rechargeable using wireless means.

Claim 9 (Currently amended): The system of claim 1 wherein the one or more physiological parameters include pressure.

Claim 10 (Currently amended): The system of claim 2 wherein the one or more physiological parameters include pressure.

Claim 11 (Currently amended): The system of claim 9 wherein the at least one sensing device is implanted so as to measure at least one ~~one or more sensing devices are measuring one or more~~ of the following pressures: left ventricular end diastolic pressure, left atrium, left atrium appendage, mean left atrium pressure, left side of the heart, right side of the heart, right atrium,

Application No. 10/677,694  
 Docket No. IB-8 (A4-1770)  
 Amendment dated February 2, 2006  
 Reply to Office Action of November 2, 2005

mean right atrium pressure, right ventricular end diastolic pressure, differential pressure between left and right atrium.

Claim 12 (Original): The system of claim 11 wherein said system calculates the change of pressure over time ( $dp/dt$ ).

Claim 13 (Currently amended): The system of claim 10 wherein the at least one sensing device is implanted so as to measure at least one ~~one or more sensing devices are measuring one or more~~ of the following pressures: left ventricular end diastolic pressure, left atrium, left atrium appendage, mean left atrium pressure, left side of the heart, right side of the heart, right atrium, mean right atrium pressure, right ventricular end diastolic pressure, differential pressure between left and right atrium.

Claim 14 (Original): The system of claim 13 wherein said system calculates the change of pressure over time ( $dp/dt$ ).

Claim 15 (Currently amended): The system of claim 1 wherein the sensing device sends data directly to a drug delivery device to tailor drug treatment of the patient. ~~measurement of physiological parameters is used to~~

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

~~tailor drug treatment of patients with congestive heart failure.~~

Claim 16 (Currently amended): The system of claim 2 wherein the  
sensing device sends data directly to a drug delivery device to tailor drug  
treatment of the patient. ~~measurement of physiological parameters is used to~~  
~~tailor drug treatment of patients with congestive heart failure.~~

Claim 17 (Currently amended): The system of claim 1 wherein a  
resonant scheme is used to couple the sensing device to the readout device.

Claim 18 (Currently amended): The system of claim 2 wherein a  
resonant scheme is used to couple the sensing device to the readout device.

Claim 19 (Currently amended): The system of claim 1 wherein a  
passive scheme is used to couple the sensing device to the readout device.

Claim 20 (Currently amended): The system of claim 2 wherein a  
passive scheme is used to couple the sensing device to the readout device.

Claim 21 (Currently amended): The system of claim 1 wherein an

Application No. 10/677,694  
 Docket No. IB-8 (A4-1770)  
 Amendment dated February 2, 2006  
 Reply to Office Action of November 2, 2005

active scheme is used to couple the sensing device to the readout device.

Claim 22 (Currently amended): The system of claim 2 wherein an active scheme is used to couple the sensing device to the readout device.

Claim 23 (Currently amended): The system of claim 1 wherein the one or more physiologic parameters monitored by the system includes ~~physiologic parameter being measured is~~ one or more of the following ~~parameters: parameters~~ pressure, temperature, flow, blood composition, blood gas content, chemical composition, acceleration, vibration.

Claim 24 (Currently amended): The system of claim 2 wherein the one or more physiologic parameters monitored by the system includes ~~physiologic parameter being measured is~~ one or more of the following ~~parameters: parameters~~ pressure, temperature, flow, blood composition, blood gas content, chemical composition, acceleration, vibration.

Claim 25 (Currently amended): The system of claim 1 wherein the at least one sensing device is implanted at a location chosen from the group ~~consisting of: location of said implantable sensing devices is one or more of~~

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

~~the following:~~ atrial septum, ventricular septum, aorta, left ventricle, left atrium, left atrium appendage, right ventricle, right atrium, pulmonary artery, wedge position in pulmonary artery.

Claim 26 (Currently amended): The system of claim 2 wherein the at least one sensing device is implanted at a location chosen from the group consisting of: ~~location of said implantable sensing devices is one or more of the following:~~ atrial septum, ventricular septum, aorta, left ventricle, left atrium, left atrium appendage, right ventricle, right atrium, pulmonary artery, wedge position in pulmonary artery:

Claim 27 (Currently amended): The system of claim 1 wherein said system is adapted for use in at least one ~~used for one or more~~ of the following applications: early diagnosis of a heart failing due to congestive heart failure related conditions, early intervention in treatment of congestive heart failure related conditions, tailoring of medications, disease management, identification of complications from congestive heart failure related conditions, identification of complications from cardiovascular disease related conditions, treatment of complications from congestive heart failure related conditions, treatment of complications from cardiovascular disease related conditions, feedback



Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

regarding the impact of medication on the heart, pacing adjustments, reduction in frequency and severity of hospitalizations due to cardiovascular diseases, reduction in frequency and severity of hospitalizations due to congestive heart failure, tuning of defibrillator or pacemaker parameters to improve congestive heart failure related conditions, identification of mitral valve stenosis, treatment of mitral valve stenosis ~~including but not limited to surgery and balloon angioplasty.~~

Claim 28 (Currently amended): The system of claim 2 wherein said system is adapted for use in at least one ~~used for one or more~~ of the following applications: early diagnosis of a heart failing due to congestive heart failure related conditions, early intervention in treatment of congestive heart failure related conditions, tailoring of medications, disease management, identification of complications from congestive heart failure related conditions, identification of complications from cardiovascular disease related conditions, treatment of complications from congestive heart failure related conditions, treatment of complications from cardiovascular disease related conditions, feedback regarding the impact of medication on the heart, pacing adjustments, reduction in frequency and severity of hospitalizations due to cardiovascular diseases, reduction in frequency and severity of hospitalizations due to congestive heart

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

failure, tuning of defibrillator or pacemaker parameters to improve congestive heart failure related conditions, identification of mitral valve stenosis, treatment of mitral valve stenosis ~~including but not limited to surgery and balloon angioplasty.~~

Claim 29 (Currently amended): The system of claim 1 wherein said readout device is adapted for use in at least one ~~capable of performing one or more~~ of the following: remote monitoring of congestive heart failure patients, ~~including but not limited to home monitoring,~~ monitoring of congestive heart failure patients with telephone-based (or similar method) data and information delivery, monitoring of congestive heart failure patients with wireless telephone-based (or similar method) data and information delivery, monitoring of congestive heart failure patients with web-based (or similar method) data and information delivery, closed-loop drug delivery to treat congestive heart failure, closed-loop pacemaker parameter tuning to treat congestive heart failure or congestive heart failure related conditions, warning systems for critical worsening of congestive heart failure or congestive heart failure related conditions, portable or ambulatory monitoring or diagnosis, ~~diagnostic systems,~~ battery-operation capability, data storage, reporting global positioning coordinates for emergency applications, communication with other medical

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

devices chosen from the group consisting of ~~including but not limited to~~  
pacemakers, defibrillator, implantable cardioverter defibrillator, implantable  
drug delivery systems, non-implantable drug delivery systems, and wireless  
medical management systems.

Claim 30 (Currently amended): The system of claim 2 wherein said  
readout device is adapted for use in at least one of the following: ~~capable of~~  
~~performing one or more of the following~~ remote monitoring of congestive heart  
failure patients, ~~including but not limited to home monitoring,~~ monitoring of  
congestive heart failure patients with telephone-based (or similar method) data  
and information delivery, monitoring of congestive heart failure patients with  
wireless telephone-based (or similar method) data and information delivery,  
monitoring of congestive heart failure patients with web-based (or similar  
method) data and information delivery, closed-loop drug delivery to treat  
congestive heart failure, closed-loop pacemaker parameter tuning to treat  
congestive heart failure or congestive heart failure related conditions, warning  
systems for critical worsening of congestive heart failure or congestive heart  
failure related conditions, portable or ambulatory monitoring or diagnosis,  
~~diagnostic systems,~~ battery-operation capability, data storage, reporting global  
positioning coordinates for emergency applications, communication with other

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

medical devices chosen from the group consisting of ~~including but not limited to~~ pacemakers, defibrillator, implantable cardioverter defibrillator, implantable drug delivery systems, non-implantable drug delivery systems, and wireless medical management systems.

Claim 31 (Currently amended): A system for monitoring one or more physiological parameters for at least one of diagnosis and treatment of congestive heart failure within a patient, said system comprising:

at least one sensing device implanted in a cavity of the patient's cardiovascular system, said sensing device comprising at least one inductor coil and at least one sensor, with optional electronic components;

a non-implantable readout device that is not implanted in the patient, said readout device comprising at least one inductor coil having telemetric means for at least one of ~~allowing~~ electromagnetic telecommunication and electromagnetic wireless powering of said sensing device through said at least one inductor coil of said sensing device;

wherein the system is ~~The system of claim 1~~ incorporated into a closed-loop system with a left atrium to right atrium unidirectional valve for preventing the development of pulmonary edema.

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

Claim 32 (Original): The system of claim 2 incorporated into a closed-loop system with a left atrium to right atrium unidirectional valve for preventing the development of pulmonary edema.

Claim 33 (Original): The system of claim 1 wherein said non-implantable readout device includes a barometric pressure sensor.

Claim 34 (Currently amended): The system of claim 33 wherein said barometric pressure sensor is adapted ~~used~~ to compensate for variations in atmospheric pressure.

Claim 35 (Original): The system of claim 2 wherein said non-implantable readout device includes a barometric pressure sensor.

Claim 36 (Currently amended): The system of claim 35 wherein said barometric pressure sensor is adapted ~~used~~ to compensate for variations in atmospheric pressure.

Claim 37 (Currently amended): The system of claim 1 wherein said implantable sensing device is configured for implantation ~~implanted~~ using a

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

minimally invasive outpatient technique.

Claim 38 (Currently amended): The system of claim 1 wherein said implantable sensing device is configured for implantation using a catheter delivery method ~~is used to implant the implantable sensing devices.~~

Claim 39 (Currently amended): The system of claim 2 wherein said implantable sensing device is configured for implantation ~~implanted~~ using a minimally invasive outpatient technique.

Claim 40 (Currently amended): The system of claim 2 wherein said implantable sensing device is configured for implantation using a catheter delivery method ~~is used method is used to implant the implantable sensing devices.~~

Claim 41 (Currently amended): The system of claim 1, wherein said anchoring mechanism is chosen from the group consisting of: implantable sensing device uses ~~anchoring mechanisms for~~ including but not limited to those used in one or more of the following: septal occluder devices, anchoring mechanisms for left atrial appendage occluders, anchoring mechanisms for

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

cardiac pacing leads, screws, tines, and stents.

Claim 42 (Currently amended): The system of claim 41 wherein said anchoring mechanism comprises means opening on at least one side of the septal wall and ~~utilizes an anchor that passes through a septum wall and opens on one or both sides of a septal wall,~~ clamping said implantable device to the septal wall.

Claim 43 (Currently amended): The system of claim 41 wherein the portion of said anchoring mechanism ~~utilizes an anchor that~~ passes through the atrial septum of the heart.

Claim 44 (Currently amended): The system of claim 43 wherein the anchoring mechanism comprises ~~method is similar to anchoring of septum occluder devices, wherein two umbrella-shaped anchors~~ disposed on opposite sides of the atrial septum. ~~one on each side which anchor the sensing device.~~

Claim 45 (Canceled)

Claim 46 (Original): The system of claim 41 wherein said anchoring

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

mechanism is a helical screw.

Claim 47 (Currently amended): The system of claim 41 wherein said anchoring mechanism is a tine that ~~expands and~~ catches on a trabeculated ~~trabeculated~~ area of the heart.

Claim 48 (Original): The system of claim 41 wherein said anchoring mechanism is made from one or more or any combination thereof the following materials: nitinol, teflon, stainless steel, polymer, titanium, biocompatible metals.

Claim 49 (Currently amended): The system of claim 2, wherein said implantable sensing device comprises an anchoring mechanism chosen from the group consisting of: ~~uses anchoring schemes including but not limited to those used in one or more of the following~~ anchoring mechanisms for septal occluder devices, anchoring mechanisms for left atrial appendage occluders, anchoring mechanisms for cardiac pacing leads, screws, tines, stents.

Claim 50 (Currently amended): The system of claim 49 wherein said anchoring mechanism comprises a portion passing ~~utilizes an anchor that~~



Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

~~passes through a septum wall~~ of the heart and means opening on at least one  
side of the septal wall and ~~opens on one or both sides of a septal wall,~~  
clamping said implantable device to the septal wall.

Claim 51 (Currently amended): The system of claim 49 wherein said  
anchoring mechanism comprises a portion passing ~~utilizes an anchor that~~  
~~passes through the atrial septum~~ of the heart.

Claim 52 (Currently amended): The system of claim 51 wherein the  
anchoring mechanism comprises ~~method is similar to anchoring of septum~~  
~~occluder devices, wherein~~ two umbrella-shaped anchors disposed on opposite  
sides of the atrial septum. ~~one on each side which anchor the sensing device.~~

Claim 53 (Currently amended): The system of claim 51 wherein ~~the~~  
~~larger portion of~~ said implantable sensing device comprises a larger portion ~~is~~  
located in the right side of the heart and a smaller portion ~~the smaller portion of~~  
~~said implantable sensing device is~~ located in the left side of the heart and  
includes at minimum said at least one sensor in order to minimize the risk of  
thrombogenicity.

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

Claim 54 (Original): The system of claim 49 wherein said anchoring mechanism is a helical screw.

Claim 55 (Currently amended): The system of claim 49 wherein said anchoring mechanism is a tine that ~~expands and~~ catches on a trabeculated ~~tribeculated~~ area of the heart

Claim 56 (Original): The system of claim 49 wherein said anchoring mechanism is made from one or more or any combination thereof the following materials: nitinol, teflon, stainless steel, polymer, titanium, biocompatible metals.

Claim 57 (Currently amended): The system of claim 1 wherein said implantable sensing device is augmented with at least one actuator chosen from the group consisting of: ~~one or more actuators including but not limited to:~~ thermal generators, voltage sources, current sources, probes, electrodes, drug delivery pumps, valves, meters, microtools for localized surgical procedures, radiation emitting sources, defibrillators, muscle stimulators, pacing stimulators.

Claim 58 (Currently amended): The system of claim 2 wherein said

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

implantable sensing device is augmented with at least one actuator chosen from the group consisting of: ~~one or more actuators including but not limited to~~ thermal generators, voltage sources, current sources, probes, electrodes, drug delivery pumps, valves, meters, microtools for localized surgical procedures, radiation emitting sources, defibrillators, muscle stimulators, pacing stimulators.

Claim 59 (Currently amended): The system of claim 1 wherein said system is part of a closed-loop pacing/ICD (implantable cardioverter defibrillator) tuning mechanism wherein data from said at least one sensing device ~~said sensor data~~ is sent to a patient pacemaker for tailoring of pacing/ICD function.

Claim 60 (Currently amended): The system of claim 59 wherein said at least one sensing device ~~sensor~~ is directly interrogated by the pacing/ICD unit.

Claim 61 (Currently amended): The system of claim 59 wherein said at least one sensing device ~~sensor~~ is interrogated by the pacing/ICD unit, the system further comprising an external unit solely for ~~wherein an additional external unit is used for the sole purpose of~~ transmitting power to said at least

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

one sensing device. ~~sensor.~~

Claim 62 (Currently amended): The system of claim 59 wherein said at least one sensing device ~~sensor~~ transmits data to said readout device, ~~an external reader,~~ after which said readout device ~~reader~~ retransmits data to the pacing/ICD unit.

Claim 63 (Currently amended): The system of claim 62 wherein said readout device and ~~external reader~~ said pacing/ICD unit perform at least one function of interrogation or powering of said at least one sensing device. ~~the sensor.~~

Claim 64 (Canceled)

Claim 65 (Currently amended): The system of claim 2 ~~claim 64~~ wherein said at least one sensing device ~~sensor~~ is directly interrogated by the pacing/ICD unit.

Claim 66 (Currently amended): The system of claim 2 ~~claim 64~~ wherein said at least one sensing device ~~sensor~~ is interrogated by the

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

pacing/ICD unit, the system further comprising an external unit solely for  
~~wherein an additional external unit is used for the sole purpose of~~ transmitting  
power to said at least one sensing device. ~~sensor.~~

Claim 67 (Currently amended): The system of claim 2 ~~claim 64~~  
wherein said at least one sensing device ~~sensor~~ transmits data to said  
readout device, ~~an external reader~~, after which said readout device ~~reader~~  
retransmits data to the pacing/ICD unit.

Claim 68 (Currently amended): The system of claim 67 wherein said  
readout device and ~~external reader~~ said pacing/ICD unit perform at least one  
function of interrogation or powering of said at least one sensing device. ~~the~~  
~~sensor.~~

Claim 69 (Currently amended): The system of claim 1 wherein at  
least a portion of said implantable sensing device is coated with one or more  
layers of at least one coating material. ~~thin coatings.~~

Claim 70 (Currently amended): The system of claim 69 wherein the  
at least one coating material is chosen from the group consisting of: ~~materials~~

Application No. 10/677,694  
Docket No. IB-8 (A4-1770)  
Amendment dated February 2, 2006  
Reply to Office Action of November 2, 2005

~~include but are not limited to one or more or any combination thereof:~~ silicone,  
hydrogels, parylene, polymer, nitrides, oxides, nitric-oxide generating materials,  
carbides, silicides, titanium.

Claim 71 (Currently amended): The system of claim 2 wherein at  
least a portion of said implantable sensing device is coated with one or more  
layers of at least one coating material. ~~thin coatings~~

Claim 72 (Currently amended): The system of claim 71 wherein the  
at least one coating material is chosen from the group consisting of: ~~materials~~  
~~include but are not limited to one or more or any combination thereof:~~ silicone,  
parylene, hydrogels, polymer, nitrides, oxides, nitric-oxide generating materials,  
carbides, silicides, titanium.